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OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

REPORT OF AIRCRAFT ACCIDENT INVESTIGATION

AIRCRAFT F-16C 86-0274

CONDUCTED AT CLARK AIR BASE

REPUBLIC OF THE PHILIPPINES

14 MARCH - 18 APRIL 1989

CLEAR REGULATORY COMMISSION

Docket No. _____ Official Exh. No. 105

In the matter of PPS

Staff _____ IDENTIFIED _____

Applicant RECEIVED _____

Intervenor _____ REJECTED _____

Other _____ WITHDRAWN _____

DATE 7/1/02 Witness _____

Clerk _____

PFS Exh. 105

56749

COPY 2



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS PACIFIC AIR FORCES
HICKAM AIR FORCE BASE, HAWAII 96853-5001

REPLY TO
ATTN OF

CC

7 June 1989

SUBJECT

AFR 110-14 Report of Investigation: F-16C, #86-0274, Incident
of 14 February 1989

TO

7 AF/CC

The subject report of investigation is approved.

A handwritten signature in black ink, appearing to read "Merrill A. McPeak".

MERRILL A. McPEAK, General, USAF
Commander in Chief

56750



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SEVENTH AIR FORCE (PACAF)
APO SAN FRANCISCO 96370-5000

REPLY TO
ATTN OFF: CC

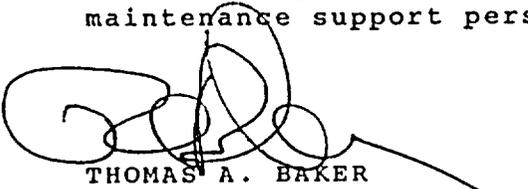
9 May 1989

SUBJECT: AFR 110-14 Accident Investigation, Kunsan AB F-16c

¹⁰ CINCPACAF/CC

1. In accordance with PACAF Sup 1 to AFR 110-14, para 9C(2) the attached aircraft accident investigation is forwarded for final approval.

2. There were no injuries to civilians and no structural damage except for the aircraft which was destroyed. Therefore, no claims are anticipated. There is no evidence to indicate that disciplinary or administrative action is warranted against any maintenance support personnel.



THOMAS A. BAKER
Lieutenant General, USAF
Commander

56751



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SEVENTH AIR FORCE (PACAF)
APO SAN FRANCISCO 96370-3000

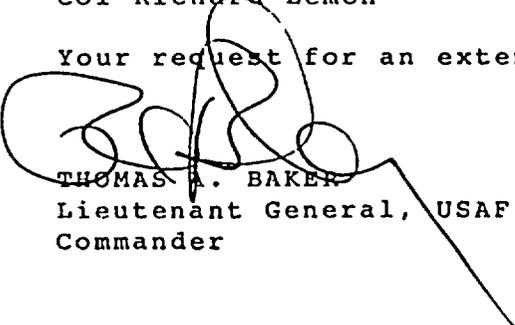
REPLY TO
ATTN OF: CC

10 Apr 89

SUBJECT: Request for Extension, Aircraft Accident Investigation

TO: Col Richard Lemon

Your request for an extension until 19 April 1989 is granted.


THOMAS A. BAKER
Lieutenant General, USAF
Commander

56752

SUMMARY OF FACTS
AIRCRAFT ACCIDENT INVESTIGATION, AFR 110-14
CLARK AB, REPUBLIC OF THE PHILIPPINES

1. Statement of Authority and Purpose. The Commander, Seventh Air Force, appointed Colonel Richard C. Lemon on 11 March 1989, to investigate the aircraft accident on 14 February 1989, involving an F-16C, 86-0274, coded PACAF/CC, and assigned to the 8th Tactical Fighter Wing (8TFW) Kunsan AB, Republic of Korea.

2. Summary of Facts:

a. History of Flight - On 14 February 1989, Satan 31 flight was scheduled for a Cope Thunder large force employment strike mission as two F-16 aircraft with call signs Satan 31 (flight lead) and Satan 32 (accident aircraft). Satan 31 flight was integrated into the large force package of fourteen F-16s as the final two aircraft following three four-ships; call signs Panton 01, Falcon 11, and Viper 21. Takeoff was scheduled for 0730 hours local (L) time (Zone H); actual takeoff was at 0756L. Take off sequence was Panton 01, Viper 21, Falcon 11, and Satan 31. Satan 31 flight planned single ship takeoffs with 20 seconds spacing between aircraft. The package target was on Crow Valley Range with egress to the south and west, and recovery at Clark AB. The accident aircraft impacted a mountain ridge during the first egress leg from the target at approximately 0816L.

Base and local news media were involved in reporting the accident and further inquiries concerning this accident should be directed to the attention of the Commander 7th Air Force.

b. Mission - Satan 31 flight's mission was to deliver air-to-ground ordnance as a part of a large coordinated strike on a simulated airfield complex. The objective was to deliver practice bombs in a single pass with Satan 31 delivering from a 10 degree pop-up release and Satan 32 following with a 20 degree pop-up delivery. The aircraft was configured with two 370-gallon external fuel tanks, six BDU-33 practice bombs on triple ejector racks (TER-9A), one captive AIM-9L air-to-air missile, 510 rounds of 20mm cannon ammunition and one aircraft measurement device.

c. Briefing and Preflight - The briefing was conducted in two stages. A mass briefing was held for all the 14 February Cope Thunder morning missions at 0510L. The general attack plan, weather and intelligence situation were briefed as was Cope Thunder administrative information. The leaders for the four component flights had all participated in the detailed planning for the mission on the previous afternoon, 13 February. Capt. Stewart (Satan 31) Lt. Levin (Satan 32) both participated in the detailed planning session. There were no unresolved questions as they left the mass briefing.

The individual flights then briefed their part of the mission. Capt. Stewart used the MCM 55-116 briefing guides to conduct the briefing. All required items were briefed including specifically: low altitude navigation, formations to be flown during all phases of flight, weather route abort and lost wingman procedures. (Tab V-10).

The briefing was conducted normally, There was adequate time for questions and no unresolved issues remained when the two pilots departed for their aircraft.

Crew rest was adequate. Testimony placed Lt. Levin in his quarters not later than 2030-2100L the night before the accident.

d. Flight Activity - Satan 31 (the flight leader) and 32 (the accident pilot) took off at 0756L and joined the other twelve F-16s on the departure leg as the fourth of four flights in trail formation with two miles front to back spacing between the flights. The overall flight route is shown at Tab AA-1.

The ingress route to the initial point (IP) was flown as briefed without deviation, although the mission was slightly behind, but well within timing for the scheduled range block.

All four flights used the same IP, a prominent 1273 foot hill (15'20.2N, 120 degrees 25.2E), and departed in the planned attack sequence. All fourteen aircraft were sharing the same UHF strike frequency. Due to a limited number of VHF frequencies available, only three were available for the four flights. Panton 01 and Viper 21 had discreet intraflight frequencies and Falcon 11 and Satan 31 shared the third frequency.

To minimize communications the plan called for only the leaders of each flight to acknowledge frequency changes, so it cannot be certain Satan 32 was on the correct UHF strike frequency as the attack began.

Satan 31 and 32 departed the IP at approximately 0813L on a heading of approximately 203 degrees, magnetic, and maintained that heading until approximately five nautical miles from the target. Satan 32 had moved to the briefed attack formation, a wedge, as they departed. At five miles from the target Satan 31 and 32 entered a valley one ridgeline west of the Crow Valley Range target complex to mask themselves from the target defenses. Satan 32 was observed moving to a trail position, as briefed, to allow him to also use the valley. This is the last point at which Satan 31 is certain he had visual contact with his wingman as he turned his attention to the attack.

Satan 31 began the pop up maneuver just prior to four miles from the target, slightly earlier than planned due to a perceived error in his inertial navigation system (it later proved to have been accurate). As Satan 31 he began his ascent, Satan 32 made a call on the VHF radio to remind his leader to use self defense flares. This indicates he was

situationally aware of his proximity to the target and, also confirms he was on the correct VHF frequency.

Both Satan 31 and 32 attacked the target on a heading of approximately 135 degrees magnetic as planned. Satan 31 delivered his bombs on target, began a hard left turn as he pulled off and reversed immediately to the right to defeat air defense tracking. He continued a right descending turn to the valley one ridgeline southeast of the target to remask as planned and briefed. As he was executing the right turn he looked over his shoulder and thought, but was not certain, he saw Satan 32 in his 20 degree pop up maneuver.

Range video tape confirms the attack sequence as he described it.

Satan 32 failed to release his bombs for an unknown cause, and began a descending right hand turn across the same ridgeline as his leader.

At this point the egress deviated from the plan. All the flights had planned to egress using the valleys to the southeast of the target to maintain terrain masking from the target area defenses until approximately five nautical miles south of the target. The plan was to then climb to a higher low level altitude and proceed to the next route turn point, Mt. Pinatubo (15 degrees 08.3N 120 degrees 21.4E).

Satan 31 and 32 planned to use a direct route, crossing the intervening ridgeline at approximately grid coordinates TS180 780.

While the weather in the target area had been as briefed and did not restrict bomb deliveries, there was a significantly lower cloud deck covering the high terrain within 3-4 nautical miles of the turn point at Mt. Pinatubo (see photo at Tab Z-1).

The mission commander, realizing the route could not be safely flown, called to suggest the egressing flights cut the route short and turn to the southwest north of the intended turn point. Satan 31 heard the call in the vicinity of the IP, before the attack began and at approximately three nautical miles south of the target climbed out of the valley and began a right turn to the southwest. Since it is uncertain Satan 32 was on the UHF strike frequency, he may not have heard the change in egress routing.

Satan 31 assumed Satan 32 had him in sight as he began this turn southwest since Satan 32 had not made a "blind" call, to suggest he no longer had visual contact with his leader.

Shortly after turning southwest, Satan 31, not seeing his wingman emerge from the valley, made a "blind" call on the VHF radio to Satan 32, indicating he did not have him visually. Procedures, if Satan 32 heard the call and had his leader in sight, are for him to acknowledge the call with his position relative to the leader or to return the "blind" call if he did not have the leader in sight. Satan 31 did not hear either response.

Communications jamming was moderate and it is possible some radio calls could have been masked by jamming.

Satan 32 disappeared from view of the range video camera behind the ridgeline heading approximately 230 degrees (at grid coordinates TS188843). From that point there is no direct evidence which confirms his flight path to the crash site, and no testimony from other flight members which provides any additional information.

Detailed terrain analysis, however, indicates only two routes which remain under the low cloud deck and provide low altitude egress to the crash site (Tab AA-2). The first of these routes is a valley extending generally southward, one ridgeline east of Crow Valley. This is the valley through which Satan 31 egressed (hereafter referred to as the "western" valley).

The second route is the second valley to the southeast of Crow Valley. It runs generally south, then southwest toward the crash site (hereafter referred to as the "eastern" valley). Diagrams showing vertical sections of both valleys, to the crash site, are at Tabs R-9 and R-10.

There is evidence to support the possible use of either route and factors which work against each.

Egress through the western valley is the more obvious choice. It had been briefed as the egress route and is more closely aligned with Satan 32's heading as he disappeared over the ridgeline. The valley is relatively straight and its floor rises very slowly for the first two miles to the south. Visually acquiring Satan 31 would have been difficult as he was approximately 1.5 NM ahead of Satan 32 and presented a tail-on view. In fact, with 1.5 NM spacing, Satan 31 would be leaving the valley at virtually the same time Satan 32 entered it.

Search data from Satan 32's radar might have identified his leader southbound ahead of him, but line-of-sight interruptions, especially after Satan 31 turned to the southwest, may have masked the leader's departure from the valley. Radio communications -- notably Satan 31's first "blind" call -- could have likewise been blocked by the terrain.

Satan 32 would rapidly be approaching the terrain, now rising more rapidly and interfacing with the low cloud deck. He could still make a right (westbound) turn out of the valley as his leader had done, but a delay of even a few seconds, perhaps waiting for another radar update on his leader's position, would place him in a position (approximately point E on the enlarged map, Tab AA-3), where turning to the west and still avoiding the cloud covered terrain could be difficult.

At that some point he initiated a vertical pull up to miss the high terrain to his front. The table at Tab R-11 provides a matrix of pull ups

from nominal points inside point G with climb angles, times to impact and times in which Satan 32 would have been in the weather before impact.

Climb angles range from 8.2 degrees (corresponding to the crash site climb angle) for a pull up at point G, to 24.9 degrees at point A (the inside limit at which that angle will miss the lower terrain and still impact the crash site). It should be noted, however, that the point from which the 8.2 degree climb would be initiated in the western valley is at a location from which a turn to the southwest could still be made without entering the weather. These values represent average climb angles; a steeper angle could have been initiated and then shallowed, not a reasonable maneuver after entering the clouds. (See vertical section, Tab R-9)

Three factors may have contributed to why such a relatively shallow climb was initiated once the decision was made to route abort:

First, the interface of cloud and terrain along the ridgeline is particularly deceptive, especially with strong sunlight shining through the clouds. The result is to make the ragged interface, with some clouds behind jutting lower ridges, appear to be the top of the ridge instead of intermediate terrain. This phenomenon was observed on several occasions by this investigator in helicopter flights to and from the crash site. The photograph at Tab Z-2 accurately illustrates the illusion created; the clouds are at almost (slightly higher) the identical elevation as on 14 February. The overlay depicts where the actual top of the ridge is located.

Secondly, low level route study on 1:250,000 scale maps may have added to the deception. Spot elevations in the Mt. Pinatubo area on that scale map are limited to Mt. Pinatubo (5725 feet) and Mt. McDonald (4364). Testimony from flyers on the mission that day suggests that most pilots, upon seeing a spot elevation annotated on the map, tend to believe it represents the highest terrain in the immediate area. In fact, most pilots interviewed did not realize that Mt. McDonald and Mt. Pinatubo were separate peaks. They referred to the whole mass of high terrain as "Big Mac". An additional spot elevation of 3271 feet is annotated along the planned route and less than two miles from the crash site which has an elevation of approximately 4700 feet!

None of the interviewed pilots flying the accident strike package was aware the intervening ridgeline (on which the impact occurred) had several ridges and peaks with elevations as high as 4900 feet MSL. One interviewed pilot realized the spot elevations were not necessarily the highest local terrain.

Finally, at the point Satan 32 decided to exit the low altitude route vertically, his inertial navigation system would have indicated Mt. Pinatubo (the highest local terrain) was still approximately 3 nautical miles in front of him.

A right turn to offset Mt. Pinatubo to the left of his flight path, combined with a climb may have been considered adequate to provide clearance while expediting a rejoin with his leader. In fact, a right turn would be required from the western valley to align the aircraft to the estimated heading at impact.

The alternative route, the 'eastern' valley approach, would have required a nearly immediate left turn toward the southeast shortly after Satan 32 disappeared from the range video camera. Some additional maneuvering would be necessary to enter this valley, but once in it the conditions are more consistent with the evidence.

The 'eastern' valley, while initially north-south, begins a right turn which could naturally cause a pilot following it to turn to the southwest to maintain cloud-ground clearance as the interval between them decreased. At this point the interval is approximately 1,000 feet and the valley points directly at the crash site.

Additionally, being separated from his leader by a high intervening ridge, Satan 32 could not have seen his leader depart the 'western' valley visually. Additionally, line-of-sight, for radar information concerning his leader's position, would have been blocked by the terrain. Radio communications between the two aircraft could have likewise be blocked.

As the high terrain was approached, the opportunity to turn southwest toward the 'clear' air would have rapidly been denied to Satan 32, as the intervening ridge to his west was either cloud covered or presented a narrow interval between cloud and terrain (less than 500 feet) which would have been difficult and dangerous to negotiate.

Finally, the additional maneuvering required to get into and follow the valley, and, under the deteriorating conditions, a natural tendency to reduce the aircraft speed, could account for the relatively slow airspeed estimated from the post-impact engine analysis. In fact, Satan 31, who had to do substantially less maneuver, testified his airspeed was "much lower than we wanted -- down to around 350 knots" on egress.

Trapped by the rising terrain in front and to the right, Satan 32, at some point, elected to vertically exist the low altitude environment. The data in Tab R-11 show nominal pull up points along the route from Point E, which corresponds to an average climb of 8.2 degrees (the impact climb angle), to Point A which represents a climb angle of 14.7 degrees. Point A is the inside limit of where a pull up could be established which would miss the lower terrain and still strike the crash site (see vertical section, Tab R-10).

Again, the relatively shallow climb angles (8.2 to 14.7 degrees) can best be explained by deceptive conditions, described earlier, which led

Satan 32 to believe the terrain immediately in front of his abort was not a threat.

His inertial navigation system would have shown Mt. Pinatubo, the "high" terrain, to be nearly 3 miles away at Point E, and as he climbed into the weather on a heading of approximately 230 degrees, the mountain would be 30-45 degrees left of his flight path.

Times to impact, depending on pull up point and airspeed, range from 7.0-16.9 seconds, with 6.1-14.8 seconds of that time to impact being "in the clouds" (Tab R-11).

Testimony from 35TFS pilots indicates a nearly universal technique briefed for weather route aborts; "military power climb at 30 degrees nose high until achieving visual meteorological conditions or the route abort altitude/minimum safe altitude whichever is reached first."

As it is not written either in 35TFS Squadron Standards, or in any other higher headquarters guidance, it is not considered procedure, however.

It is nearly certain that Satan 32 did not execute this technique. Had he done so at any point along his flight path, he would have either climbed above the impact point or struck the ridge at a lower elevation. (See Tabs R-9/R-10)

The abort from low altitude was almost certainly made hastily as conditions for visual flight deteriorated. Some emotional frustration and stress may have existed due to just having come off target without releasing ordnance, complicated by a futile visual search for his leader. Finally, deceptive visual cues concerning the nature of the rising terrain immediately to his front, supported by inertial navigation information which showed the "high terrain" still some 3 miles ahead, may have contributed to a reduction in situational awareness which could have led Satan 32 to believe a more aggressive pull up was not necessary.

e. Impact - The accident aircraft impacted a mountain ridgeline at 15 degrees 09.75' north latitude, 120 degrees 21.50' east longitude (Universal Transverse Mercator Coordinates: 51P TS 1657 7791) or 268 degrees magnetic for 12 nautical miles from Clark AB.

The impact was at approximately 4700 feet above mean sea level (MSL); just below a peak surveyed at 4822 feet. The crash time was approximately 0816L, 14 February 1989.

Reconstructing the flight path, from tree cuts prior to and at impact, indicates the very top of a lateral cusp shaped ridgeline (See photo Tab S-2) was struck, with initial contact of lower fuselage and the right wing and its external stores. The aircraft was in a shallow climb of approximately 8.2 degrees and in a shallow left bank of approximately 5.9

degrees. The heading was approximately 238 degrees magnetic. The photo at Tab Z-3 details the conditions at impact. Evidence from engine post-impact analysis suggests the true airspeed at impact may have been as low as 320-350 knots (Tab V-6). Although this airspeed seems low for the engine at near military power, heavy maneuvering to avoid weather and terrain prior to pulling up and out of the low altitude environment may have caused significant airspeed decay prior to impact. The shallow left bank may be the beginning of a left turn to miss the ridge above and to the right, the outline of which may have been visible at the last instant.

The aircraft appears to have initially struck the more shallow (approx. 30 degrees), tree covered northeast face of the ridgeline, began to break up as it plowed through the soil which is approximately 24 inches deep. It then struck the relatively steep east face (45-50 degrees) of the cusp where, upon striking firmer rock strata, was deflected upward with some components deflected slightly leftward (Tab R-2).

Due to the relatively shallow impact angle (approximately 22 degrees), the debris skipped upward as the aircraft began to break apart. Very little debris, except that associated with external stores and components in the lower fuselage were found at the initial impact site. There was almost no fire damage at the initial impact site, further indicating break up and fire after the debris was thrust upward to the southwest.

No cockpit instruments were retrieved to confirm these estimates which were made from measurements at the crash site. Upper range airspeed estimates in the abort matrix (Tab R-11) are based on egress speed of other flight aircraft flying a similar track under identical conditions.

The impact point was obscured by a thick cloud deck with a base estimated by several witnesses, in the air and on the ground, at 3,300-3,500 feet MSL. The surrounding terrain is extremely rugged, heavily forested with thick undergrowth. Slopes in excess of 45-50 degrees are common.

There were no eyewitnesses to the crash and no damage to property or injuries to local inhabitants occurred.

f. No attempt to eject was evident and no malfunctions of the ejection system are suspected.

g. Personal and Survival Equipment - Personal and Survival equipment was properly carried by the accident pilot and equipment inspections were complete and current. This equipment was not used post-impact.

h. Rescue:

The crash occurred at approximately 0816L, 14 February 1989. The first call occurred at 0900L when the 3rd Tactical Fighter Wing (3TFW) command post notified the 13AF Special Operations Officer (13AF/DOS, Maj

Dempsey) of an overdue aircraft. An immediate communications search and check of alternate airfields was conducted with negative results. Maj. Dempsey assumed rescue coordinator duties immediately (Tab V-4).

The first helicopter was launched by the 31 Aerospace Rescue and Recovery Squadron (ARRS) at 1024L after determining probable route/flight path information.

Wreckage was discovered from a helicopter at 0725L, 17 February. Medical personnel could not be safely put on the ground until 0815L, 17 February. A USAF flight surgeon identified remains which confirmed the pilot a fatality at 1415L, 17 February.

i. Crash Response:

The initial search and rescue effort centered on a line between the target and the Mt. Pinatubo region. Helicopters from the 31ARRS and 3TFW flew search sorties of all valley areas along the probable flight path on 14 February, but were limited by ceilings of 3500 to 4000 feet MSL. A Navy P-3 was launched from Cubi Point NAS to conduct an infrared search of the off-shore portion of the egress route.

On day two, 15 February, the 31APRS flew three helicopter search sorties and expanded the search pattern to cover all valleys and coastal regions north and west of the Mt. Pinatubo area, but were still unable to approach the most likely crash site due to heavy cloud cover at elevations above 3,500 feet. Three ground search parties were also dispatched to the suspected crash area, but met with negative results.

On the third day, 16 February, the 31ARRS flew two helicopter search sorties on the north and east slopes of Mt. Pinatubo, including some of the higher terrain. Two ground search parties searched the lower elevations without success. Clouds still obscured all terrain above 4500-5000 feet MSL.

The impact site of Satan 32 was discovered during a helicopter search at 0725L on 17 February. Medical personnel were placed on the site at 0815L and a ground search party, provided with crash site coordinates arrived at 1045L. After a thorough search of the site, the pilot's remains, confirming him as a fatality, were located 1415L. Two RF-4 aircraft launched from Kadena AB to join the search were directed to return to base after the site was located.

There were no significant delays in the rescue notification process although the mission commander and flight leader did not report Satan 32 had failed to rejoin the flight until after landing. They had thought Satan 32 may have joined another egressing flight as he departed the area.

The initial helicopter search was launched as soon as enough data were available to direct the search effort.

Weather and extremely rugged terrain delayed the location of the crash site significantly. These delays did not affect survivability of the pilot, as his death was instantaneous on impact.

There were no delays caused by civilians at the crash site, local law enforcement coordination or due to the time of day the accident occurred.

j. Maintenance Documentation:

There were no maintenance discrepancies noted in the AFTO Form 781 which relate to the accident.

There were six airframe and two engine Time Compliance Technical Orders not yet accomplished and awaiting kits. The aircraft was ready for flight since the nearest suspense/grounding date was 1 May 1990 (Tab H-4 / H-5).

All scheduled aircraft inspections were satisfactorily completed.

There were no discrepancies in oil analysis records, and pre-accident oil analyses were normal (Tab J-2/3).

All time change requirements were completed on time.

There was no unscheduled maintenance performed on the aircraft since the completion of the last scheduled inspection.

On the day prior to the accident, 13 February 1989, the mishap pilot had aborted the aircraft when the End of Runway crew discovered a low main landing gear strut. Upon returning to the chocks, the strut pressures were measured and found to be within technical order tolerances.

The crew chief also found a worn hinge on an access door and repaired it on 13 February 1989.

k. Maintenance Personnel and Supervision:

Preflight servicing of the aircraft was performed IAW appropriate technical data; preflight servicing was not considered a factor in this accident.

Those who performed the routine preflight and launch were qualified to perform those tasks.

1. Aircraft Systems:

Tear down analysis of critical engine parts indicate the engine was operating normally and at a high power setting (Tab V-6).

Very little tear down analysis was conducted due to the recovery of few usable components to determine aircraft performance. No cockpit instruments were located or recovered.

m. No aircraft system or component failure is suspected. Tear down analysis was conducted by the General Electric Company on several critical engine component, which determined the engine to be operating normally (Tab V-6). The Sacramento Air Logistics Center performed tear down analysis of two angle of attack transmitters which were recovered.

Tear down analysis is not conclusive. Significant variance was indicated between the two transmitters. One was captured by the impact at the neutral position and one at full deflection. The analyst believed the relative conditions of the transmitters favored the reading of the "neutral" position, suggesting the absence of hard maneuver just prior to or at impact (Tab J-14).

No other parts were located or recovered which were deemed useful in determining operating conditions at impact.

n. Operations Personnel and Supervision:

Satan 31 and 32's mission was being conducted in accordance with Cope Thunder 89-4, Day 2 Blue Air Tasking Order, 14 Feb 89 issued by 6200TFB/DO, Clark AB, RP (Tab O-1).

The mission was authorized on a 5AF Form 3, Daily Flight Authorization/Clearance Flight Plan which was signed by Maj. Gary F. Gee, 35TFS Operations Officer, as the approving authority.

Both Capt. Stewart and Lt. Levin signed the 5AF Form 3 as clearance authority for the flight.

Capt. Stewart served as the flight briefing officer for the mission. He used appropriate briefing guides from MCR 55-116. Squadron supervisory personnel were on duty but did not attend the flight briefing, which is normal. The briefing was adequate for the mission.

o. Crew Qualifications:

Lt. Levin, the mishap pilot, was fully qualified for the mission he was flying. A review of his training, both during initial F-16 upgrade training at Luke AFB and mission upgrade training at Kunsan AB, indicated

average to above average performance. Testimony from squadron pilots and supervisors confirmed above average performance.

Some initial difficulties in formation and instrument flying at Luke AFB seem to have been overcome and no recurrence was noted during mission upgrade training or periodic flight examinations. The only accident related adverse grade slip from RTU admonished, "Do not take instrument missions lightly. They take as much premission planning and thought as tactical missions do."

During all training Lt. Levin's academic understanding and mission preparation were noted as exceptionally strong.

Lt. Levin had entered flight lead upgrade training in January 1989 at minimum eligible flying time, a strong indicator of his ability. He had completed three upgrade flights at the time of the accident.

His recent flight experience is detailed at Tab T. A summary of flights scheduled and flown in the 30 days before the accident is at Tab T-4-1. He had flown 13 sorties and 17.2 hours during that period.

The accident sortie was Lt. Levin's first Cope Thunder 89-4 mission. He had not participated in any previous Cope Thunder exercises. He was scheduled on 13 February 1989 for his first Cope Thunder mission, but ground aborted for a suspected low landing gear strut.

At the time of the accident Lt. Levin's total flying time was 552.6 total hours, with 258.4 hours in the F-16.

Capt. Stewart, the flight leader, experienced normal problems in mission upgrade training, achieving mission ready status at Hahn AB, Germany, on 27 January 1986. He subsequently upgraded to two-ship flight lead on 25 March 1987, and 4-ship lead on 28 January 1988.

Capt. Stewart arrived at Kunsan AB 11 January 1989. His first flight at Kunsan was 20 January 1989. Prior to 20 January 1989, his last previous flight was 1 December 1988, at Hahn AB.

He flew 8 sorties at Kunsan AB prior to deploying to Cope Thunder 89-4. He was certified mission ready 1 February 1989 after a mission flown 31 January 1989.

He flew a 4-ship flight lead certification mission with the squadron operations officer on 1 February 1989, and was declared a 4-ship flight leader on that date. He subsequently flew a night weapons delivery mission on 6 February to complete his local upgrade.

All sorties at Kunsan AB had been flown with squadron supervisors in the flight as required in local area orientation and upgrade certifications.

At the time of the accident Capt. Stewart had 774.4 hours in the F-16 and 1072.8 hours total flying time.

His 30-60-90 day sortie/hour totals are:
Last 30 days (8 sorties/12.5 hours)
Last 60 days (8 sorties/12.5 hours)
Last 90 Days (12 sorties/18.2 hours)

Capt. Stewart had not previously participated in Cope Thunder. The accident sortie was his first Cope Thunder mission. He was scheduled 13 February, but sympathy aborted with Lt. Levin.

A review of 35 TFS daily flight authorization/clearance flight plans indicates Capt. Stewart and Lt. Levin had flown together only once prior to the accident mission. On 30 January 1989 Lt. Levin flew as number three during a 4-ship flight lead upgrade weapons delivery mission for Capt. Stewart.

p. Lt. Levin, the accident pilot, was medically qualified to fly. All physical examinations were up to date and he had no significant or chronic conditions for which he was receiving treatment.

Postmortem toxicology tests were not performed.

The only concern involves his prescription corrective lenses. Testimony (Tab J-13) indicates it cannot be established whether he was wearing his glasses. Given his myopic condition, if, for some reason, he were not wearing them, his ability to see detail on distant images would be reduced (Tab V-12). This could exacerbate the visual illusion of cloud-ground interface at the accident ridgeline discussed in paragraph d above.

q. Navaids and Facilities. Local flight facilities were not deemed to have contributed to this accident in any manner.

r. The complete weather forecast and slide shown at the mass briefing are at Tab K-4/5. The visibility was as briefed, as were the general weather conditions. The cloud deck, forecast around the Mt. Pinatubo area, at 5,000-7,000 feet and scattered, was, in fact, lower (3,000-3,500 feet) and was overcast.

Witnesses in the air and on the ground confirm these estimates.

s. The following directives are applicable to the mission being flown at the time of the accident:

a. TAC/PACAF/USAFER (MCR) 55-116, F16 Pilot Operational Procedures, 24 Aug 1987.

- b. PACAFR 55-116, 8TFW Chapter 8, 8 TFW Operating Procedures, 9 Feb 1988.
- c. MCR 55-116, PACAF Chapter 9, PACAF Operating Procedures, 7 Oct 1988.
- d. AFR 60-1, Flight Management, 28 May 1985.
- e. AFR 60-16, General Flight Rules, 10 Dec 1985.
- f. PACAFR 51-5, Vol I, Aircrew Ground Training and Flying/Ground Training Records Procedure, 22 Aug 1984.
- g. PACAFR 51-6, Theater Indoctrination for Newly Assigned Aircrew, 30 Jun 1986.
- h. MCR 51-50, Vol VIII, Chapter 7, Tactical Aircrew Training, 16 Jan 1989.
- i. 35 TFS Squadron Employment Standards.

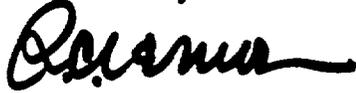
The provisions of the above directives were substantially adhered to on the accident mission. Some minor deviations seem to have occurred:

1. MCR 55-116, paragraph 2-3c, states in part "a minimum safe altitude (MSA) or Route Abort Altitude (RAA) will be annotated on all maps." Testimony from the flight leader (Tab V-10) indicates he did not so annotate and doubts if Lt. Levin had either. The abort altitude was annotated on the flight lineup card, however.

2. MCR 55-116, para 3-21m(1)(3)(a) states, "immediately climb to, or above the briefed RAA/MSA" (when route aborting in instrument meteorological conditions). Satan 32 (Lt. Levin) clearly did not "immediately" climb in accordance with the briefed and nearly universal 35TFS technique of "30 deg. nose high, power to military until above the weather or RAA/MSA whichever is lower. It is important to distinguish this as technique. No procedural guidance from PACAF/7AF or the 8TFW indicates a rate (i.e. climb angle) at which this abort should be accomplished. Squadron standards from the 35TFS do not provide guidance either.

3. MCR 55-116, paragraph 3-13b(4), covers the loss of visual contact between flight members ("blind" and "visual" calls discussed in paragraph d. above). These procedures may have not been followed strictly as Lt. Levin came off the target. The immediate reaction to threats, terrain masking are understandable explanations for the lack of an immediate "blind" call. Communications jamming and line-of-sight blocking could have also masked these calls if they were properly made.

Respectfully submitted 18 April 1989.

A handwritten signature in cursive script, appearing to read "R. Lemon".

RICHARD C. LEMON, Colonel, USAF
Accident Investigation Officer